(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 0 916 891 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
**08.09.1999 Bulletin 1999/36**

(43) Date of publication A2:
**19.05.1999 Bulletin 1999/20**

(21) Application number: **98309250.3**

(22) Date of filing: **12.11.1998**

(51) Int Cl.[6]: **F17C 13/04**, F17C 13/02, F17C 5/06

(84) Designated Contracting States:
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE**
Designated Extension States:
**AL LT LV MK RO SI**

(30) Priority: **14.11.1997 GB 9724168**

(71) Applicant: **AIR PRODUCTS AND CHEMICALS, INC.**
**Allentown, PA 18195-1501 (US)**

(72) Inventors:
- **Zheng, Dao Hong**
  **London E12 6QT (GB)**
- **Irven, John "Midways"**
  **Buckinghamshire HP15 6JS (GB)**
- **George, Mark A.**
  **Wescosville Pennsylvania 18106 (US)**

(74) Representative: **Laight, Martin Harvey**
**W.H. Beck, Greener & Co.**
**7 Stone Buildings**
**Lincoln's Inn**
**London WC2A 3SZ (GB)**

# (54) Gas control device and method of supplying gas

(57) A modular gas control device for use with a compressed gas cylinder (111) comprises a primary module (152) and a secondary module (252) mounted on the primary module. The primary module comprises a first supporting body (154) having a first main gas flow path (155) through the body. The supporting body has input connecting means (156) for mounting the body on the cylinder (111) and connecting the gas flow path (155) to communicate with the gas cylinder through a first flow path (157). Pressure reducing means (166) provides gas in the flow path at a lower pressure than in the container. Output connecting means (170) downstream of the pressure reducing means provides a low pressure outlet from the main gas flow path. A high pressure shut off valve (164) is positioned upstream of the pressure reducing means, and filling means (161, 160) allows filling of the cylinder with compressed gas through the input connecting means (156) along a second flow path (159) separate from the input flow path (157). The secondary module (252) has a corresponding supporting body (254) and main flow path (255) and corresponding output connecting means (270) and corresponding input connecting means (256) for mounting the secondary module (252) on the primary module (152). The supporting body (254) of the secondary module has a combination of two or more functional components comprising means for measuring and/or varying parameters of gas flow in the second supporting body, and/or for switching and/or venting and/or mixing gas flow in the second supporting body.

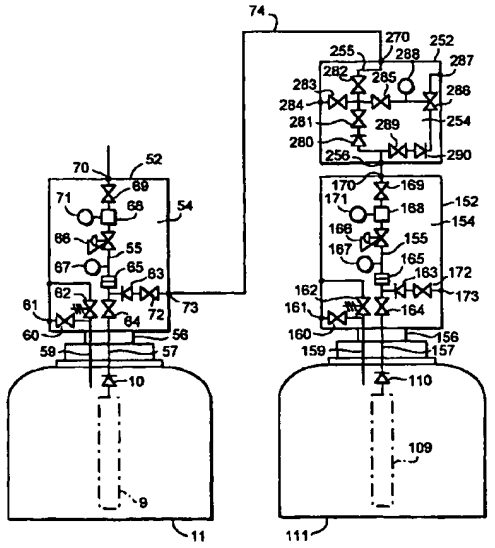


FIG. 3

EP 0 916 891 A3

European Patent Office

# EUROPEAN SEARCH REPORT

Application Number
EP 98 30 9250

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int.Cl.6) |
|---|---|---|---|
| Y | WO 96 07843 A (AIR LIQUIDE ;CANNET GILLES (FR); FANO EMMANUEL (FR); ROBIN ALAIN ()) 14 March 1996 (1996-03-14) * claims; figures * | 1-23 | F17C13/04 F17C13/02 F17C5/06 |
| Y | WO 96 29529 A (INSYNC SYSTEMS INC) 26 September 1996 (1996-09-26) * claims; figures * | 1-23 | |
| A | EP 0 688 983 A (NERIKI KK) 27 December 1995 (1995-12-27) | | |
| A,D | US 5 163 475 A (GREGOIRE ROGER J) 17 November 1992 (1992-11-17) | | |
| A,D | US 5 440 477 A (ROHRBERG RODERICK G ET AL) 8 August 1995 (1995-08-08) | | |
| | | | TECHNICAL FIELDS SEARCHED (Int.Cl.6) F17C |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| THE HAGUE | 14 July 1999 | Meertens, J |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 98 30 9250

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

14-07-1999

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| WO 9607843 A | 14-03-1996 | FR 2724241 A | 08-03-1996 |
| | | AU 687235 B | 19-02-1998 |
| | | AU 3260995 A | 27-03-1996 |
| | | BR 9506348 A | 02-09-1997 |
| | | CA 2175496 A | 14-03-1996 |
| | | EP 0727021 A | 21-08-1996 |
| | | JP 9507562 T | 29-07-1997 |
| | | US 5678602 A | 21-10-1997 |
| WO 9629529 A | 26-09-1996 | US 5605179 A | 25-02-1997 |
| | | AU 4923296 A | 08-10-1996 |
| EP 0688983 A | 27-12-1995 | AU 691270 B | 14-05-1998 |
| | | AU 2160895 A | 11-01-1996 |
| | | JP 8159397 A | 21-06-1996 |
| | | US 5738145 A | 14-04-1998 |
| US 5163475 A | 17-11-1992 | CA 2080633 A,C | 27-05-1993 |
| | | DE 69207569 D | 22-02-1996 |
| | | DE 69207569 T | 22-08-1996 |
| | | EP 0546280 A | 16-06-1993 |
| | | ES 2081543 T | 01-03-1996 |
| US 5440477 A | 08-08-1995 | NONE | |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82